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The no-tillage system applied to hybrid grape vine

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Abstract The no-tillage system is applied worldwide to maize, soybean, wheat, barley and other crops, on a surface that back in 2006 exceeded over 162 million hectares – the record being held by the United States of America. Brazil comes second, followed by Argentina.
Many authors, especially from France, studied the no-tillage system for vine and they obtained results similar to those obtained by using the classical technology as regards the grapes yield. As a consequence, the largest vineyard surfaces on which the no-tillage system is applied are in France.
In our country, the no-tillage system for noble vine was studied less, such experiments being carried out at the Stefanesti-Arges Station, at the Bistrita Station and at the Fundulea Institute.

The first results recorded in the experiments with the hybrid vine are presented in the report.

Key words

no-tillage system, hybrid vine, Stomp 330 EC, Simadon -50WP, Merlin Duo

The no-tillage system is applied worldwide to maize, soybean, wheat, barley and other crops, on a surface that back in 2006 exceeded over 162 million – the record being held by the United States of America. Brazil comes second, followed by Argentina.

Many authors, especially from France, studied the no-tillage system for vine and the results they obtained in terms of grape yields are similar to those obtained in the conventional technology.

By applying norflurazon to noble vine, Garhay (1991) destroyed all the annual monocotyledonous and dicotyledonous weeds, the soil remaining clean for 7 months. According to La Jamme and Larelle (1998), the annual monocotyledonous and dicotyledonous weed species were very well controlled by applying in the autumn the herbicide surflan based on oryzalin. Very good results were obtained in controlling the *Agropyron repens* species in France by Sang and Barchietto (1991) using non-selective sulphosate herbicide. Exceptional results in the control of all annual and perennial weed species were obtained in France by David (1991) using the herbicide Roundup based on glyphosate. The optimum homologated dose was 4320/ha glyphosate, which means 12 liters of Roundup per hectare. According to the authors, the rate of control of all perennial weed species amounted to 100%. The authors also mention that the Roundup application was fractioned, the herbicide being applied in March or April and then in June-July, because annual and perennial weeds grow in stages.

A very interesting experiment was made in Bulgaria by Kostova and Mihailova (1991). The authors studied the two technologies, conventional and no-tillage, for several years. The average grape yield recorded the interval 1983-1990 amounted to 6892 kg/ha in the conventional system and to 6969 kg/ha in the no-tillage system, so the yields recorded in the two systems were practically equal, but with big economic advantages for the no-tillage system.

Zaragoza and coll (1991) studied three technologies in the pedo-climatic conditions from Spain: the conventional technology, where the soil was laboured on and between rows, the technology in which the vine rows were treated with herbicides and the interval between vine rows was hoed, and thirdly the no-tillage technology, in which the soil was not tilled, the weeds being controlled by various herbicides. The author states that the yield of grapes recorded in the no-tillage system was 18-21% bigger than the one recorded in the conventional technology.

In our country there have been few studies concerning the no-tillage system applied to noble vine, such experiments being made at the Stefanesti Station by Radulescu and Catanescu (1991) and at the Bistrita Station, by Platon and Sarpe (2004). Unfortunately, the no-tillage system has not been adopted by viticulturists from all vine estates.

Material and Method

The experiment was made in Draganesti, Giurgiu County, on a brown podzolique soil which contains 2.1% humus and 39.9 % clay.

The annual monocotyledonous and dicotyledonous weeds were controlled in the first three

years (1997-1999) by means of Stromp 330 EC, which contains 330 g/l pendimetalin. In the interval 2000-2005, they used the herbicide Simadon 50 WP that contains simazin, and in the interval 2006-2010 they applied the herbicide Merlin Duo, which contains 37.5 g/l isoxafluotol + 375 g/l terbuthylazin. The perennial weeds Convulvulus arvensis and Taraxacum officinale were controlled by means of various herbicides based on glyphosate. We mention that the infestation with perennial weeds was extremely reduced.

The herbicide Stromp 330 EC was applied early in the spring, more precisely in March – that is before the appearance of annual weeds. Simadon 50 WP and Merlin Duo were applied in autumn, in October-November.

Results and Discussions

In table 1 we present data regarding selectivity of herbicides applied to hybrid vine.

Table 1

Selectivity of various herbicides applied to hybrid vine
Draganescu – Giurgiu County, 1997-2010

Herbicides	Rate l/ha	Selectivity after		
		30 days	60 days	90 days
1997-1999 Stomp 330 EC	5.0	1.0	1.0	1.0
2000-2005 Simadon 50 WP	3.0	1.0	1.0	1.0
2006 – Merlin Duo	3.0	1.0	1.0	1.0
2007 – Merlin Duo	3.0	1.0	1.0	1.0
2008 – Merlin Duo	3.0	1.0	1.0	1.0
2009 – Merlin Duo	3.0	1.0	1.0	1.0
2010 – Merlin Duo	3.0	1.0	1.0	1.0

From the data presented in table 1 it can be seen that the herbicides Stomp 330 EC, Simadon 50 WP and Merlin Duo were very well tolerated by the hybrid vine. During the first period of vegetation, there were no phyto-toxic symptoms such as leaves turning yellow or stropping the growth of sprouts.

Table 2

Efficacy of herbicides applied to hybrid vine
Draganescu – Giurgiu County 1997-2010

Dominant weed species				
1. Amaranthus retroflexus *2. Chenopodium album* *3. Atriplex patula* *4. Abutilon theophrasti* *5. Galinsaga paniflora*	*6. Hibiscus trionum* *7. Portulaca oleracea* *8. Setaria glauca* *9 Galium aparine* *10. Erigeron canadensis*			
Herbicides	Rate l, kg/ha	Weed control % after		
		30 days	60 days	90 days
1997-1999 – Stomp 330 EC	5.0	98	99	99
2000-2005 – Simadon 50 WP	0.0	100	100	100
2006-2010 – Merlin Duo	3.0	100	100	100
1997-2010 – Untreated	–	0	0	0

Analyzing the data presented in table 2, it stands out that in the years 1997-1999 the rate of weed control recorded by the Stomp 330 EC amounted to 98-99%.

In the years 2000-2005, the herbicide Simadon 50 WP applied in the autumn in a dose of 9 kg/ha had very good efficacy – all species of annual weeds being controlled in a proportion of 100%. A 100% rate of efficacy was also recorded in the years 2006-2010, when the herbicide Merlin Duo was applied in a dose of 3 liters per hectare.

In table 3 hereinbelow, we present the grape yield.

Table 3

Grape yield recorded fro the hybrid vine treated by application of Simadon 50 WP and Merlin Duo Draganescu – Giurgiu County 2000-2010

Years	Herbicides	Rate	Average yield	
		kg, l / ha	kg/ha	%
2000-2003	Simadon 50 WP	9.0	18,800	100
2004-2005	Simadon 50 WP	9.0	24,700	133
2006-2010	Merlin Duo	3.0	24,400	126

In the first 3 years (2000-2003), when the vine started to fructify, the average grape yield amounted to 18,800 kg/ha. In the years 2004-2005, the average grape yield amounted to 24,700 kg/ha and in the period 2006-2010 the yield recorded amounted to 24,400 kg/ha. We mention that the hybrid vine was irrigated two-three times the watering norm applied being of 200-500 m^3 per hectare.

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